

FLIPPED LEARNING, LEARNING ANALYTICS and DISTANCE EDUCATION

Keynote for BestEdu project

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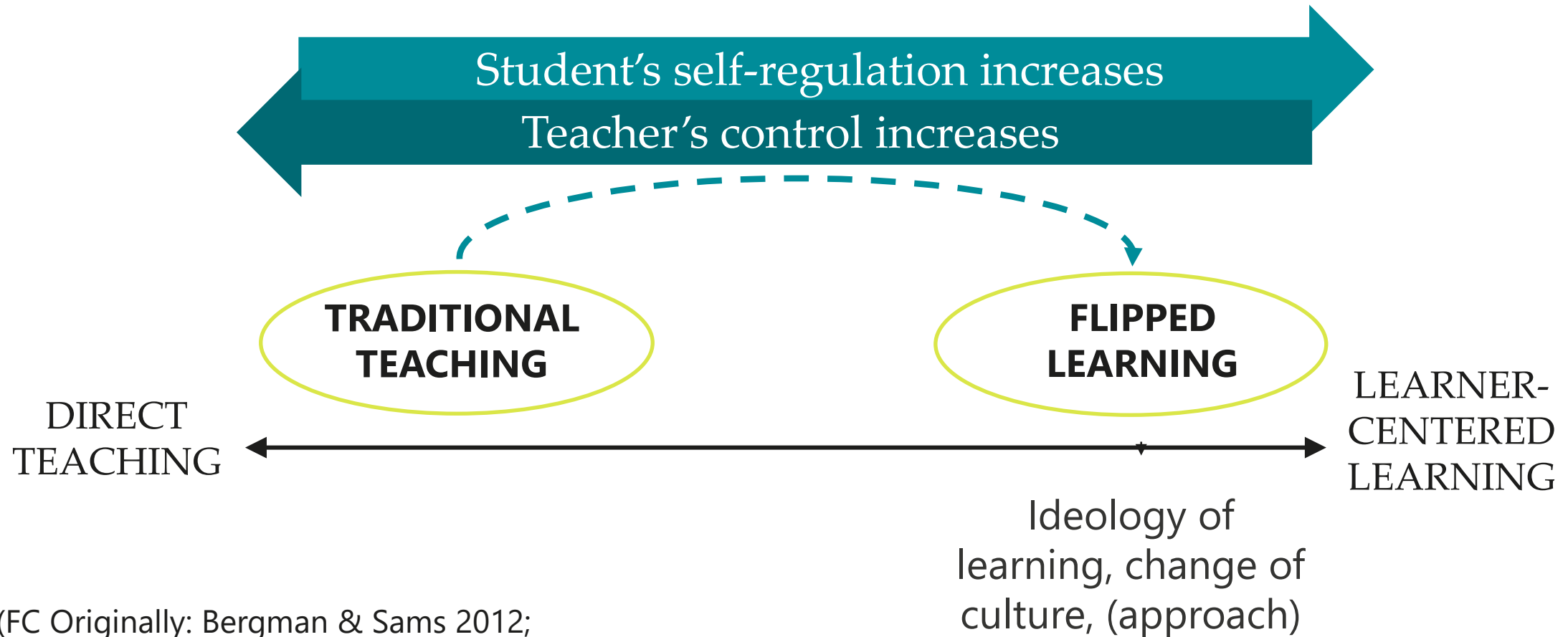
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Erkko mumble in this presentation is about:

- Recall Flipped Classroom and Flipped Learning
- Research of Flipped
- Learning Analytics
- Distance Education
- Research 1 and 2
- So what BestEdu???

Recall Flipped Classroom and Flipped Learning

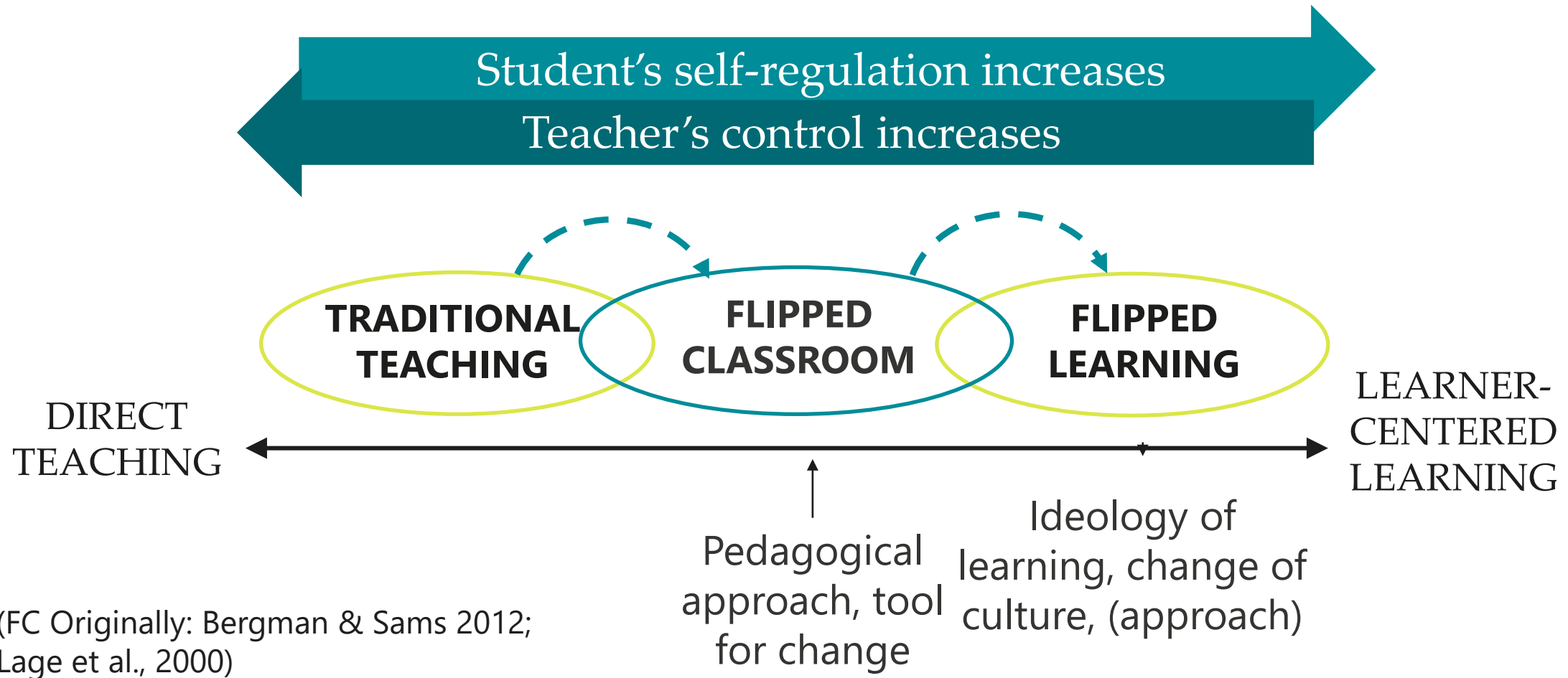
Flipped Classroom as one possible tool for change



(FC Originally: Bergman & Sams 2012;
Lage et al., 2000)

(Picture adapted from Toivola & Silfverberg 2015; see also Toivola, Peura & Humaloja 2017)

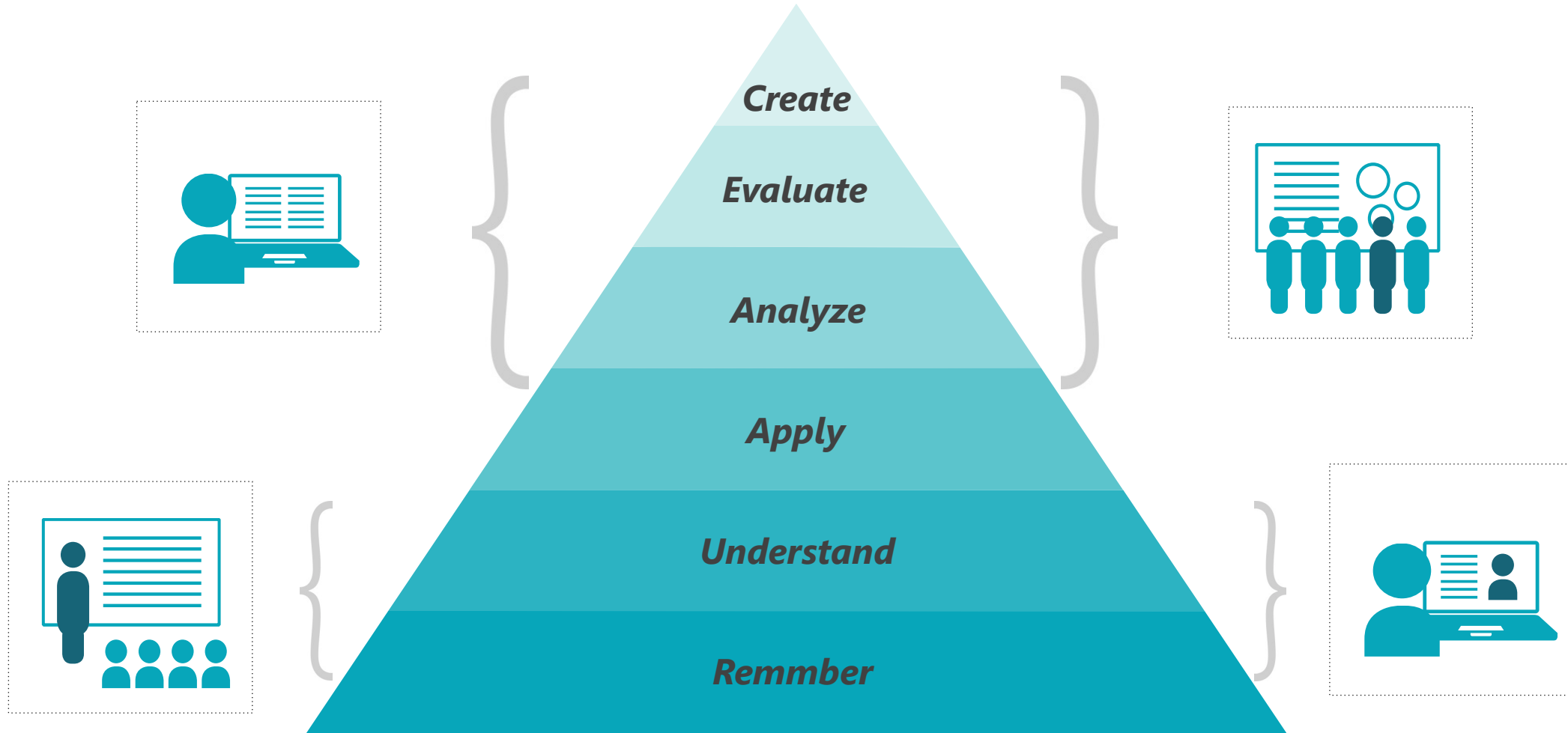
Flipped Classroom as one possible tool for change



(Picture adapted from Toivola & Silfverberg 2015; see also Toivola, Peura & Humaloja 2017)

TRADITIONAL CLASS

FLIPPED CLASSROOM

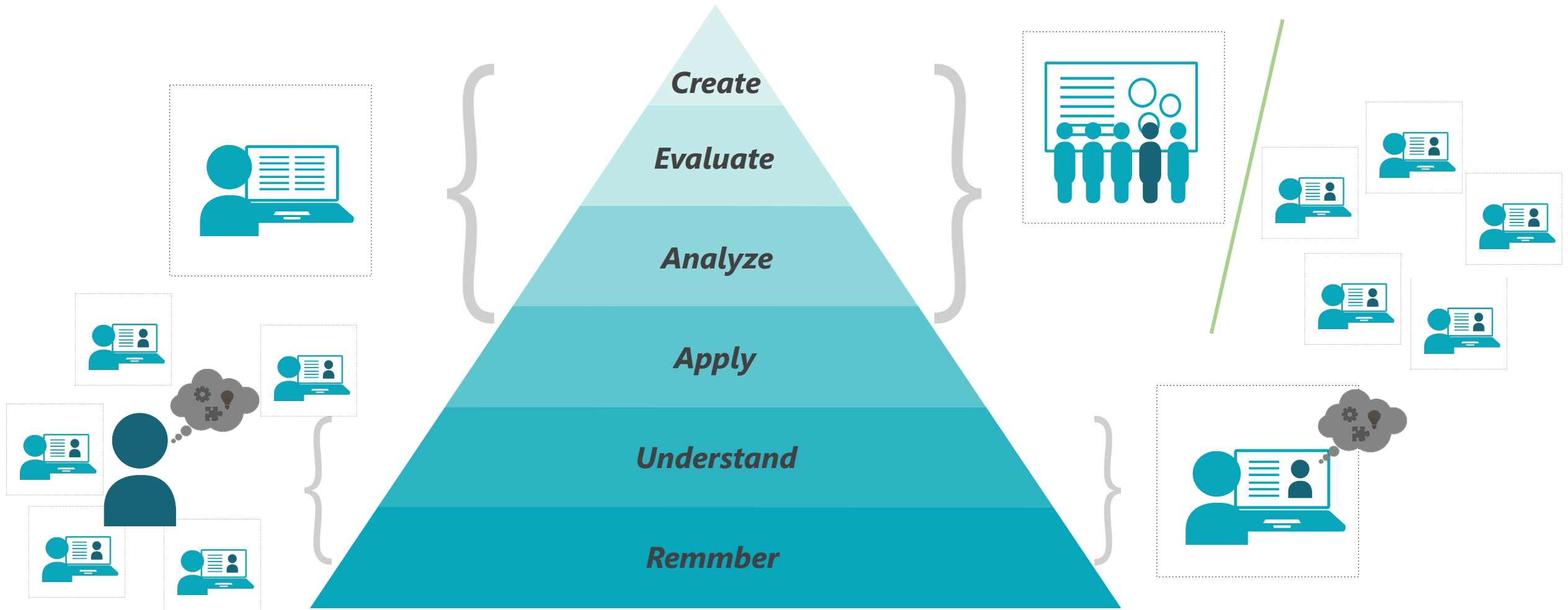


Blooms Taxonomy

Adapted from Krathwohl (2002); Williams (2013)

TRADITIONAL ONLINE

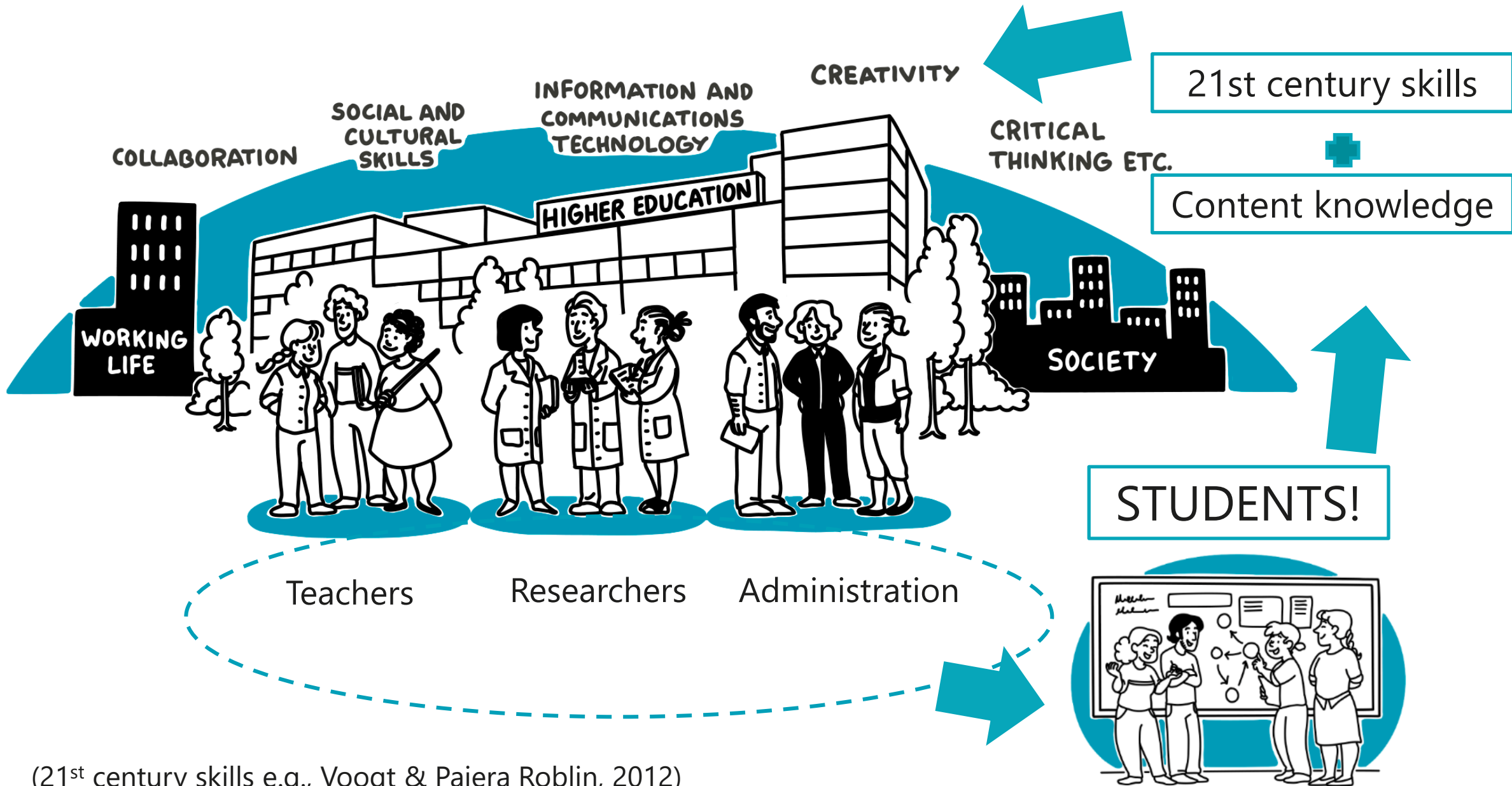
ONLINE FLIPPED Twist



Blooms Taxonomy

Adapted from Krathwohl (2002); Williams (2013)

Why? Response to a real need



(21st century skills e.g., Voogt & Pajera Roblin, 2012)

Research of Flipped:

Preliminary evidence of key factors in successful flipping: predicting positive student experiences in Flipped Classrooms.

Sointu , E., Hyypiä, M., Lambert, M. C., Hirsto, L., Saarelainen, M. & Valtonen, T. (2022). Preliminary evidence of key factors in successful flipping: predicting positive student experiences in Flipped Classrooms. *Higher Education. The International Journal of Higher Education Research*. Accepted 9.3.2022.

Background

- Student satisfaction towards flipped varies (Strelan et al., 2020)
- Factors for satisfaction are more unknown
 - Pedagogical dimension
 - Students view of their teachers' pedagogical content knowledge (PCK)
 - Pedagogical perceptions about teaching that is aimed at understanding (UND)
 - Constructive feedback
 - Level of experienced difficulty of FC (DIFF)
 - Guidance for the FC approach (GUID)
 - Social dimension
 - Collaborative working
 - Support from other students
 - Safe atmosphere for learning (SAFE)
 - Technological dimension
 - Students experienced the added value of ICT in education (AVICT)
 - Students' readiness to use ICT for studying (TECH)

**Need to
investigate what
factors create
satisfaction**

Methods

Participants and procedures

- University students ($N = 414$) at UEF , 24 courses
- Data collected during 2016-2017
- Informed consent, GDPR, ethics ok.

Analyses

- Explorative factor analysis
- Confirmatory factor analysis (CFA)
- Latent regression model (CFA + regressio)
- Pratt's (1987) measure (relative importance and contribution of each predictor in the model)

RESULTS

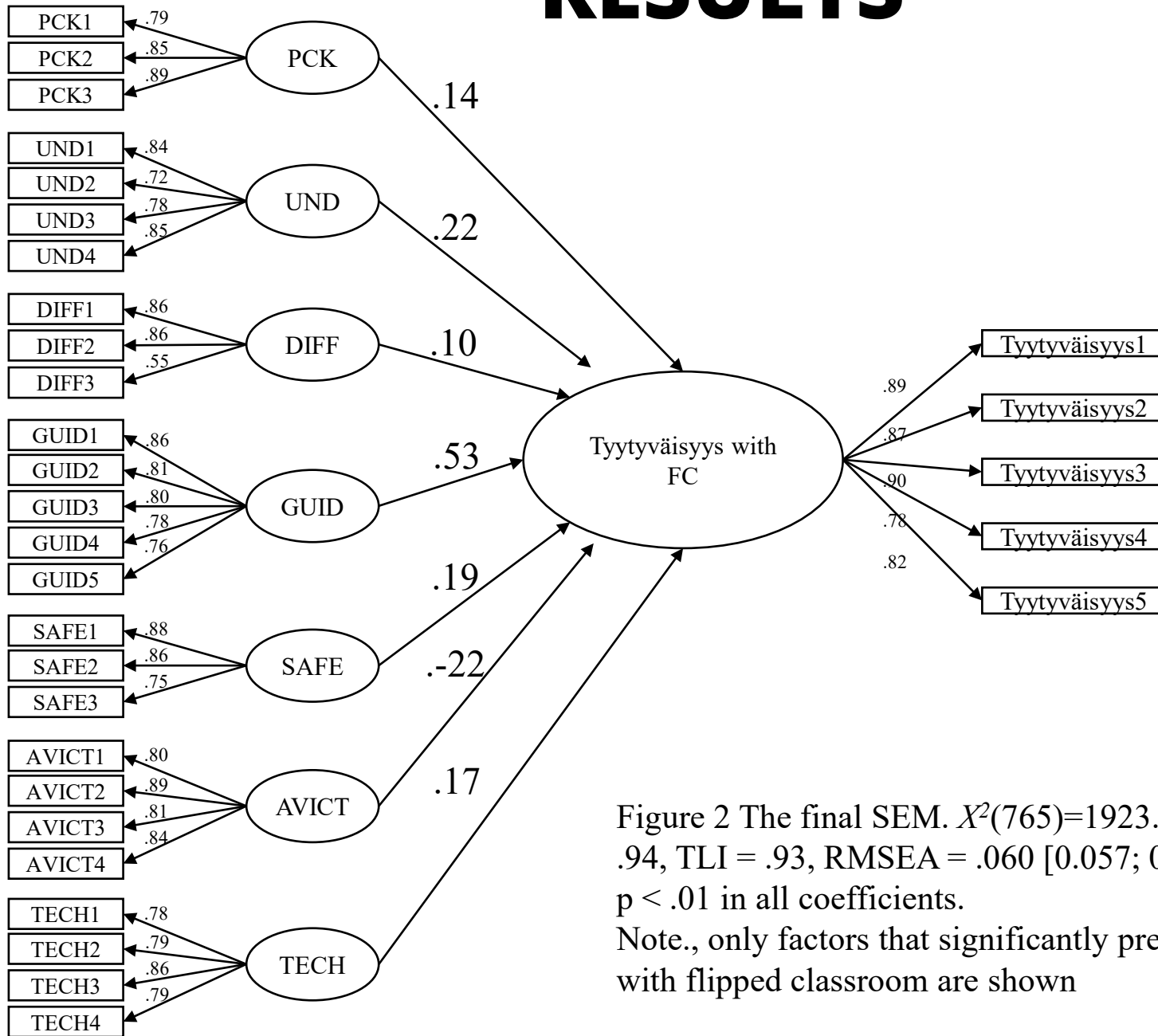
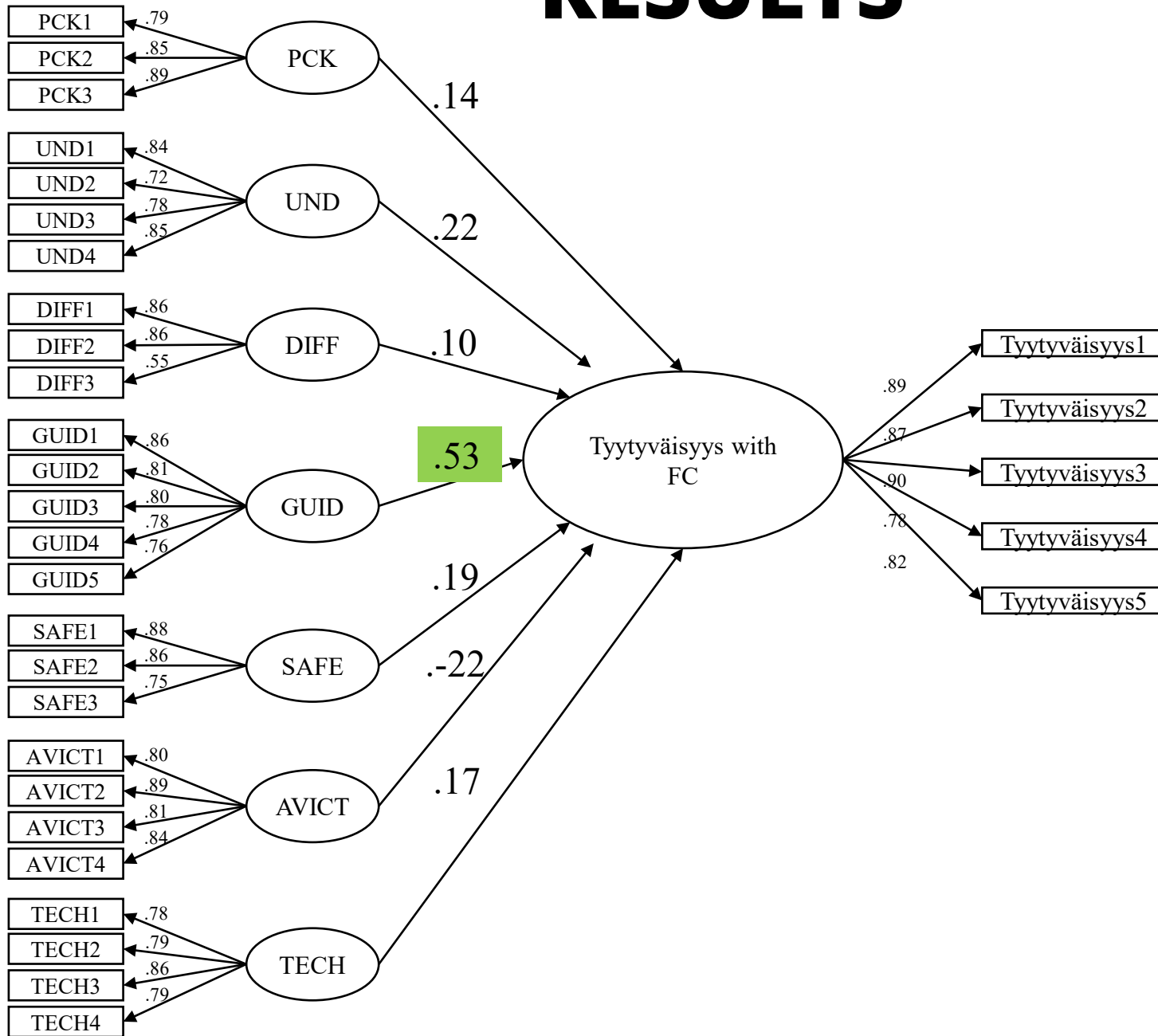


Figure 2 The final SEM. $X^2(765)=1923.28$, $p = .00$, CFI = .94, TLI = .93, RMSEA = .060 [0.057; 0.064], SRMR = .050. $p < .01$ in all coefficients.

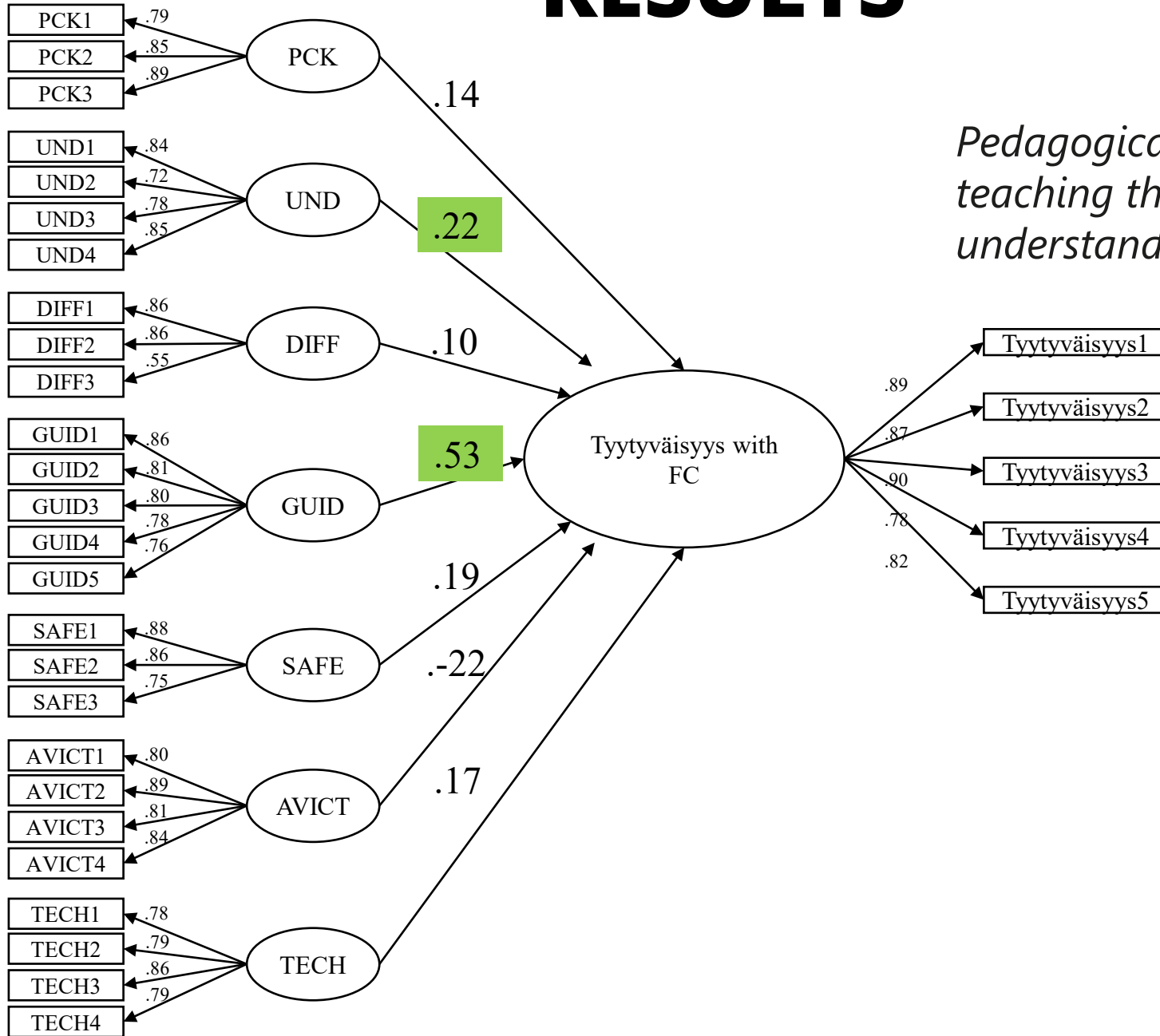
Note., only factors that significantly predicted satisfaction with flipped classroom are shown

RESULTS



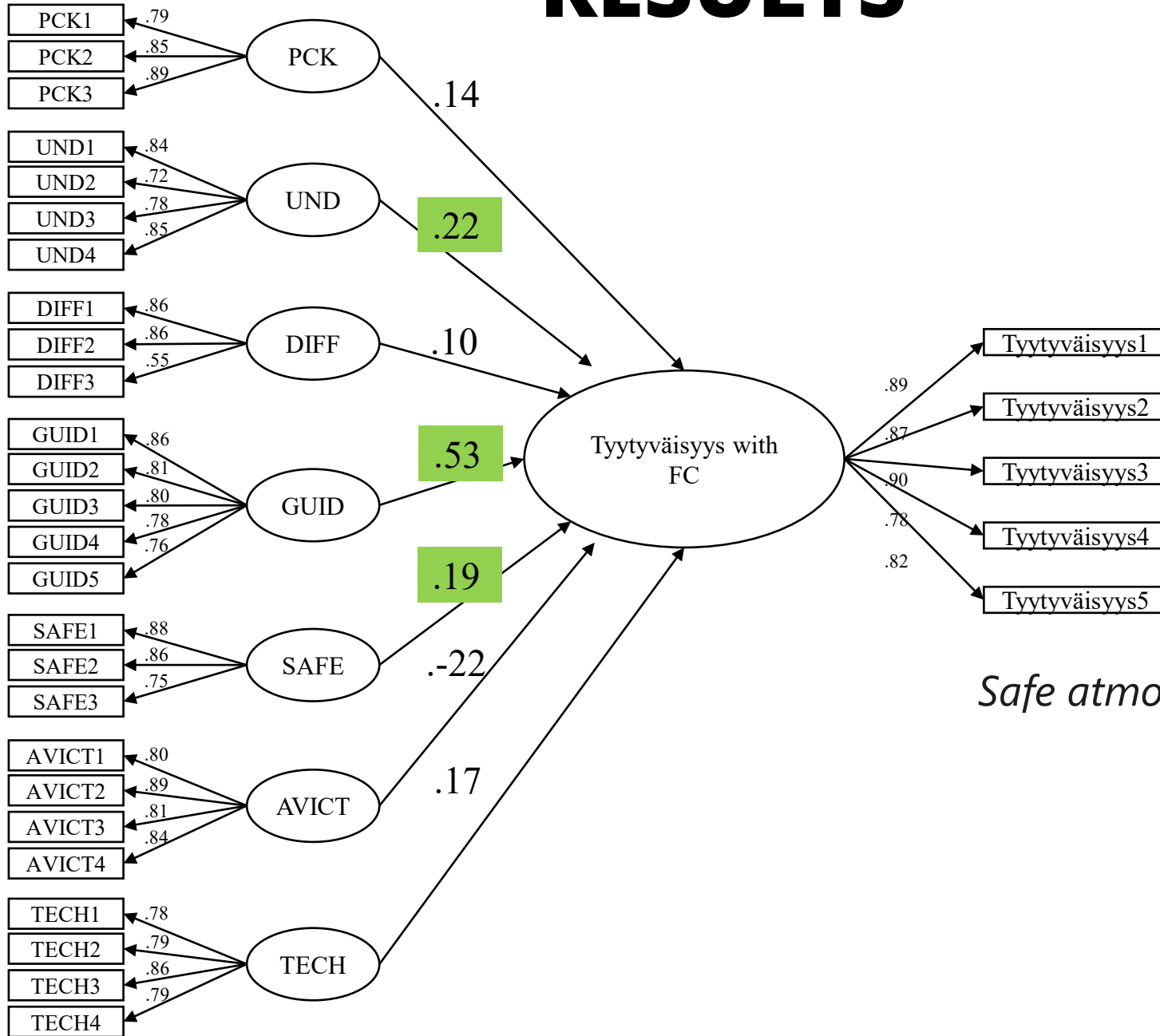
*Guidance for the FC approach (**GUID**)*

RESULTS



Pedagogical perceptions about teaching that is aimed at understanding (UND)

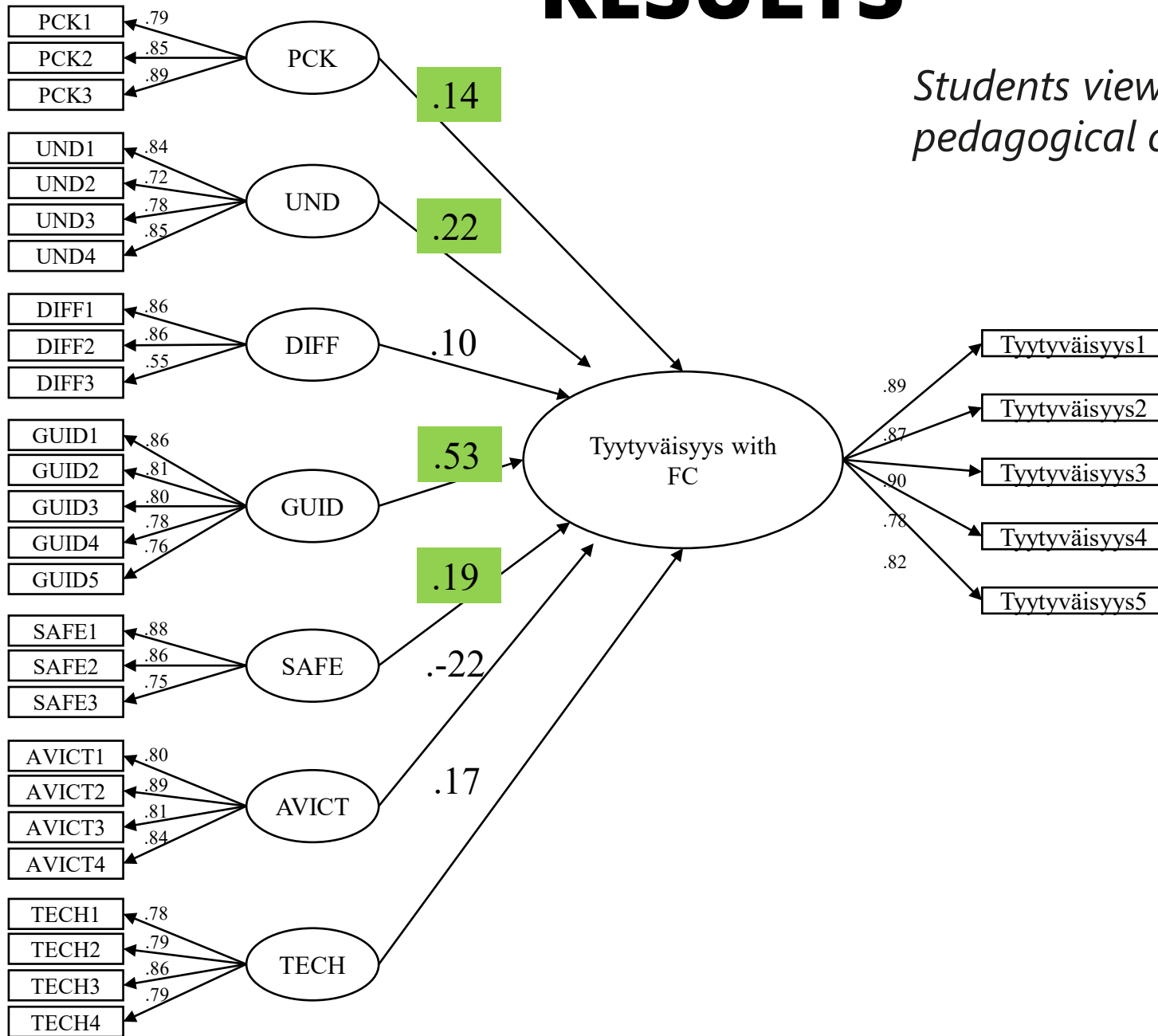
RESULTS



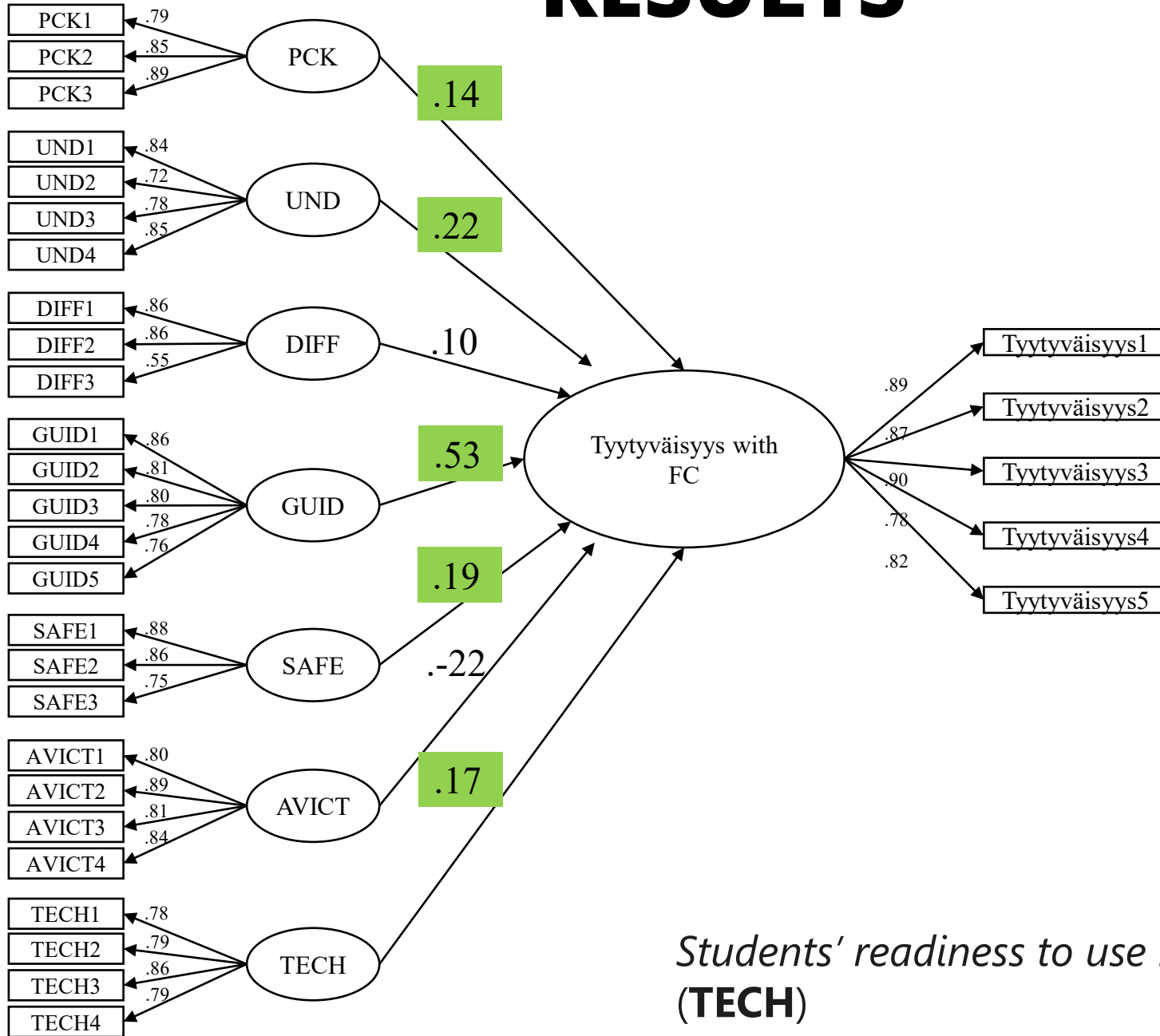
Safe atmosphere for learning (SAFE)

RESULTS

Students view of their teachers' pedagogical content knowledge (PCK)

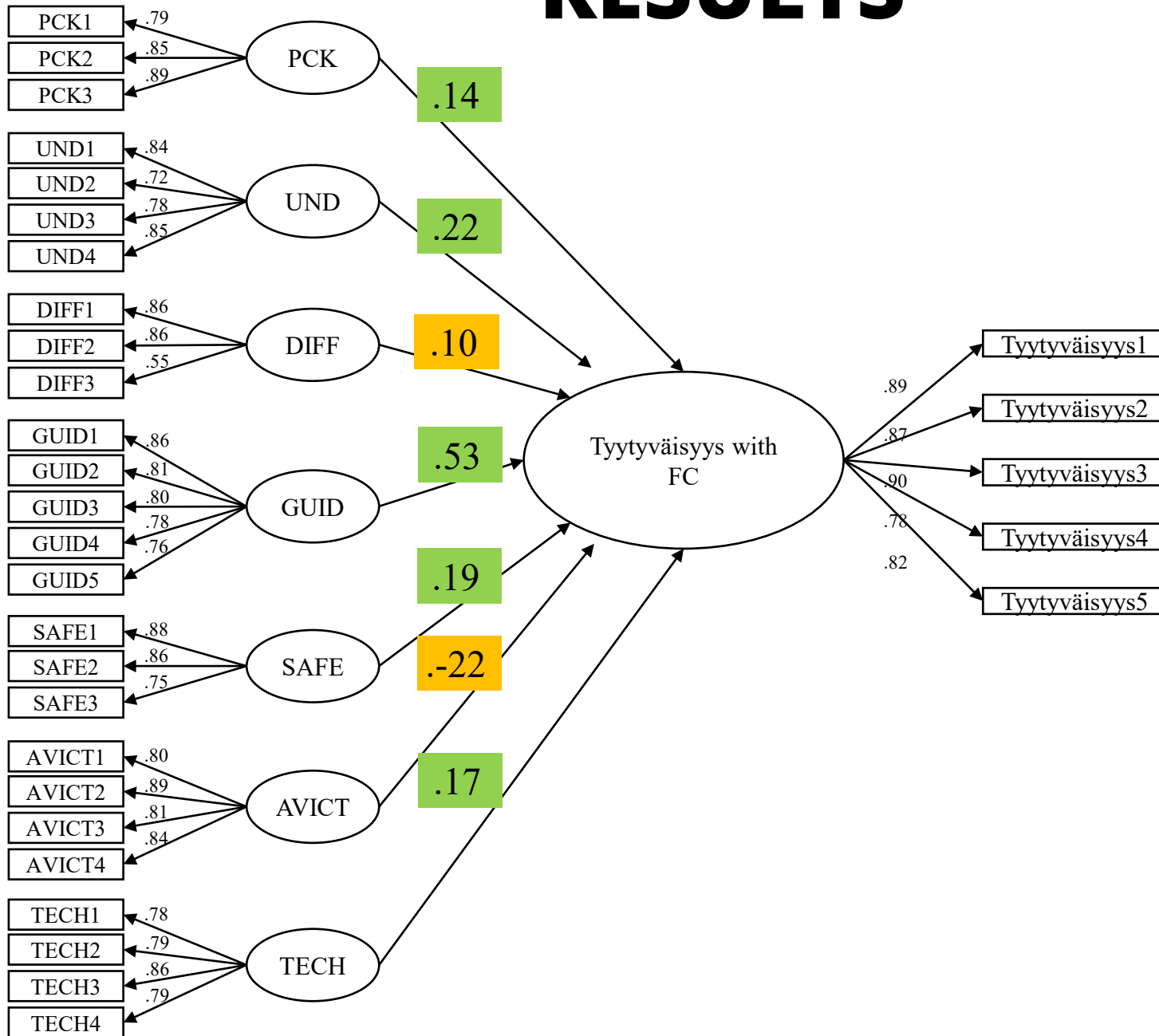


RESULTS



Students' readiness to use ICT for studying
(TECH)

RESULTS

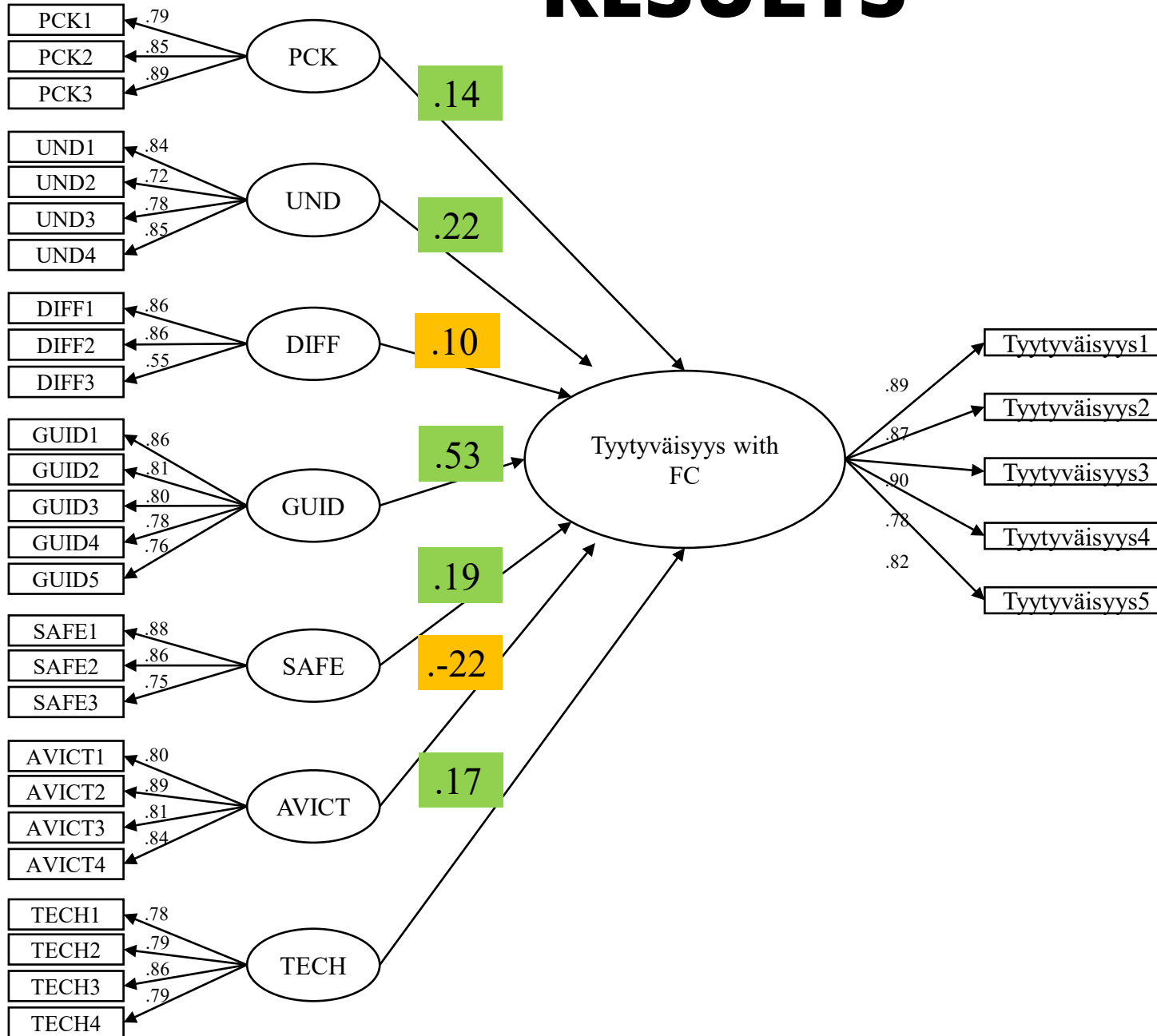


Even though

- *Level of experienced difficulty of FC (**DIFF**) was one negative contributor, and*
- *Students experienced the added value of ICT in education (**AVICT**) another contributor in the model*

→ Based on Pratt's indicator, these did not contribute uniquely to the model.

RESULTS



IF YOU WANT TO SUCCESS WITH FLIPPING:

1. GUIDE TO FC
2. AIM FOR UNDERSTANDING
3. CREATE SAFE ATMOSPHERE
4. MAKE SURE YOU CAN TEACH
5. MAKE SURE YOUR STUDENTS CAN USE ICT

→ THESE EXPLAIN 82,3 % OF THE SATISFACION

**FLIPPED PROVIDES
AN INTERESTING
VENUE FOR
LEARNING
ANALYTICS!**

Learning Analytics

UEF | OAHOT

LEARNING ANALYTICS FOR SUPPORTING LEARNING

Utilization of learning analytics in the various educational levels for supporting self-regulated learning (OAHOT)

<https://sites.uef.fi/oahot/>

Learning analytics (LA)

- **“measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs” (LAK, 2011).**
- Relies mainly on data from digital systems (e.g., digital learning environments) that students produce during their learning.
- Can provide teachers with tools to adapt lessons for those with different abilities (Kuhl et al., 2019).
- A major challenge is how pedagogical practices can fully take advantage of LA and how it can be integrated into teachers' work (Kuhl et al., 2019).
- The rich data itself as its sources does not easily transform into meaningful information that can be used for supporting teaching and learning processes (e.g., Greller & Drachsler, 2012)

Distance Education

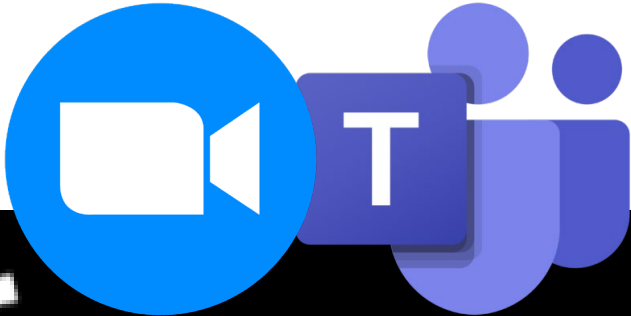
Distance Education

- Several ways to implement
- NOT EMERGENCY ONLINE TEACHING (EOL) (cf. Georgsen, 2021a, 2021b; Hodges et al., 2020; Selwyn et al., 2020).
- Flipped Learning as an approach
 - Materials available for studying in own pace
 - Own materials can be used
 - Teacher availability
- Digital learning environment
 - Learning Analytics (LA) that student and teachers can use
 - Dispositional LA (DLA) for teacher to understand more

HOW?????

Tandem use of

Teacher



LA

DLA

ERKKO, KEEP THESE IN MIND!

- 1. GUID
- 2. UND
- 3. SAFE
- 4. PCK
- 5. Students' ICT

DOES THIS WORK?!?!?

Research 1 (of LA):

Learning analytics and Flipped Learning in online teaching for supporting preservice teachers' learning of quantitative research methods.

Sointu , E., Valtonen, T., Hallberg, S., Kankaanpää, J., Väisänen, S., Heikkinen, L., Saqr, M., Tuominen V., & Hirsto, H. (2022a). Learning analytics and Flipped Learning in online teaching for supporting preservice teachers' learning of quantitative research methods. *Seminar.net – International Journal of Media, Technology & Life-long Learning*.

Research 2 (of LA):

Emotional behavior in quantitative research methods course for preservice teachers. Learning analytics approach

Sointu ., E., Saqr, M., Valtonen, T., Hallberg, S., Kankaanpää, J., Tuominen, V., & Hirsto, L. (2022b). Emotional behavior in quantitative research methods course for preservice teachers. Learning analytics approach. *In Proceedings of SITE Conference*. Washington, D.C., United States: AACE.

OAHOT implementation

1. Research studies, an important part of teacher training in Finland
2. Quantitative research methods (QRM) are challenging for students
 - From research and practice perspectives (e.g., DeVaney, 2010; Väisänen & Pitkäniemi, 2008; Ylönen & Väisänen, 2005)
 - Fear, worries, anxiety
 - Experienced difficulties in math and previous QRM courses
3. This challenges teaching practices, and learning, new approaches needs
4. COVID-19 and distance education!



Methods

Context

- Preservice teachers / Quantitative methods course / fall 2020
 - Distance education (COVID): Zoom and Teams tandem
 - Valamis –digital learning environment for learning, teaching, using analytics for learning and supporting students

Participants and procedures

- Well informed, possibility to ask questions etc.
- DLA part of their studies (reflection of own learning)
- All data collected from Valamis
- UEF ethics approval (statement 11/2020)
- I was the teacher in the course, research after the course (ethics)

- Research 1: DLA (i.e., questionnaires in Valamis)
 - Anonymous data $N = 36$ (response rate 95 %; $M_{age} = 25,9$).
 - Aim was to know, how **Self-regulation, Self-efficacy for learning, Orientations for learning** and **Experienced emotions** change during the course
- Research 2: DLA and LA
 - Anonymous data $N = 40$
 - Time and user data (learning materials)
 - Aim was to understand how students in various clusters based on emotions (DLA) use learning materials based on LA data

Research 1

- Descriptive statistics (T1-T5)
 - Profiles base on mean (M) perustuen
- Paired sample t-test (bootstrap) for T1 and T5 measurement points
 - M , SD , Cohen's D (D) efect size (ES) (Cohen, 1988)

Research 2

- Cluster analysis (K-means) for emotions (T1)
 - Silhouette for goodness of fit (Kodinariya & Makwana, 2013)
 - Separation based on Kruskal–Wallis (Ostertagová ym., 2014) with Holmen p (Aickin & Gensler, 1996)
 - Epsilon sqr ES, 95 % confidence interval (Rea & Parker, 2014)
- LA data (learning materials use; time data) based on cluster
 - uninterrupted students' activities(López-Pernas et al., 2021)

Results research 1

Profiles based on mean (M, SD) and ES (D)

Measured areas (T1-T5):

- Self-regulation of learning processes and results
- Lack of regulation
-
- Self-efficacy for learning
- Extrinsic goal orientation
-
-
- Mastery orientation
-
-
- Enjoyment towards QRM



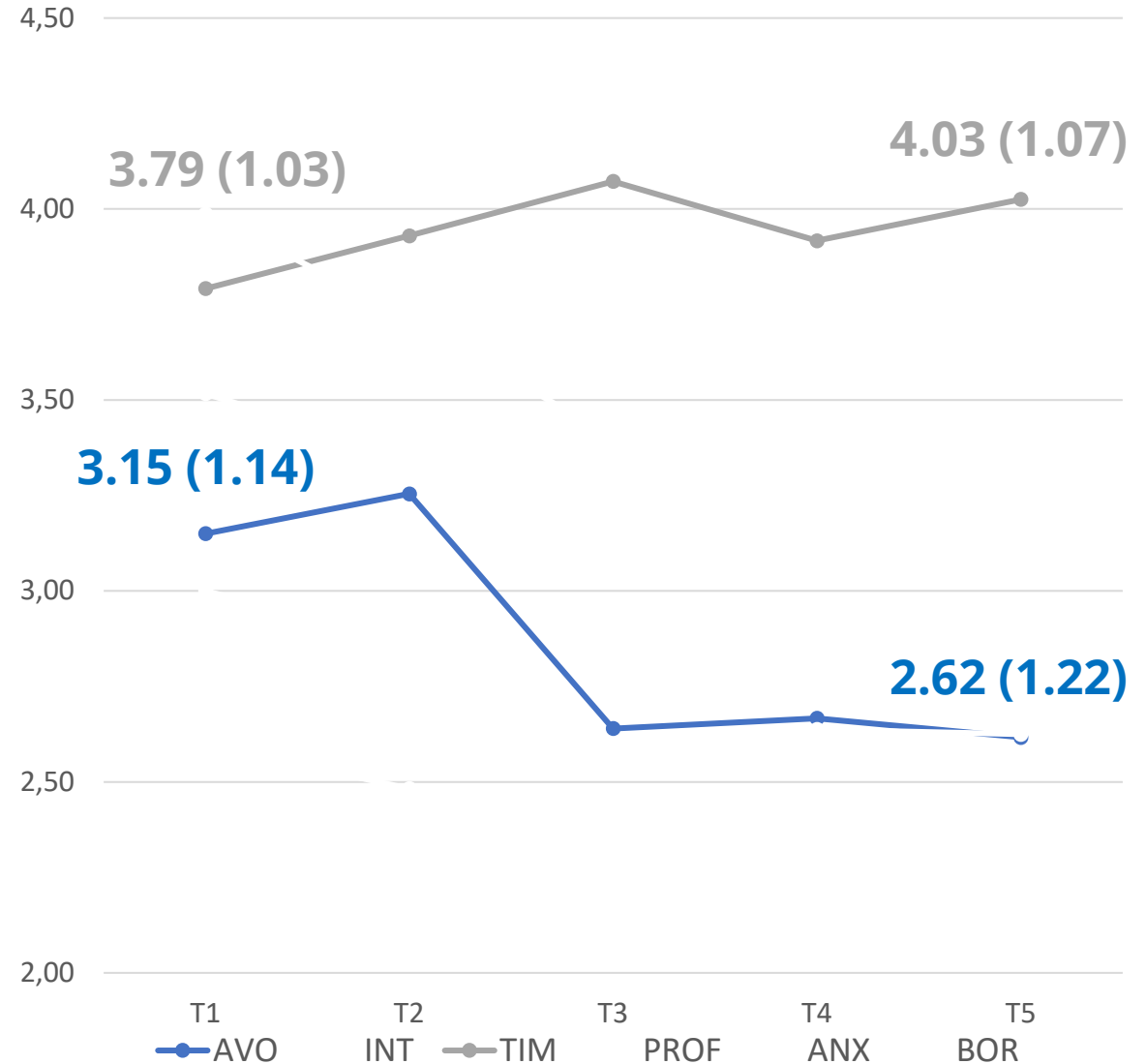
**NO STATISTICALLY
SIGNIFICANT
CHANGES T1-T5**

Profiles based on mean (M, SD) and ES (D)

Measured areas (T1-T5):

-
-
- **Task avoidance (AVO) ($D = 0.71^{**}$)**
-
-
-
- **Time management (TIM) ($D = -0.38^*$)**
-
-
-

****** Cohen D ES intermediate ($D = 0,5-0,8$)
***** Cohen D ES small ($D = 0,2-0,5$)

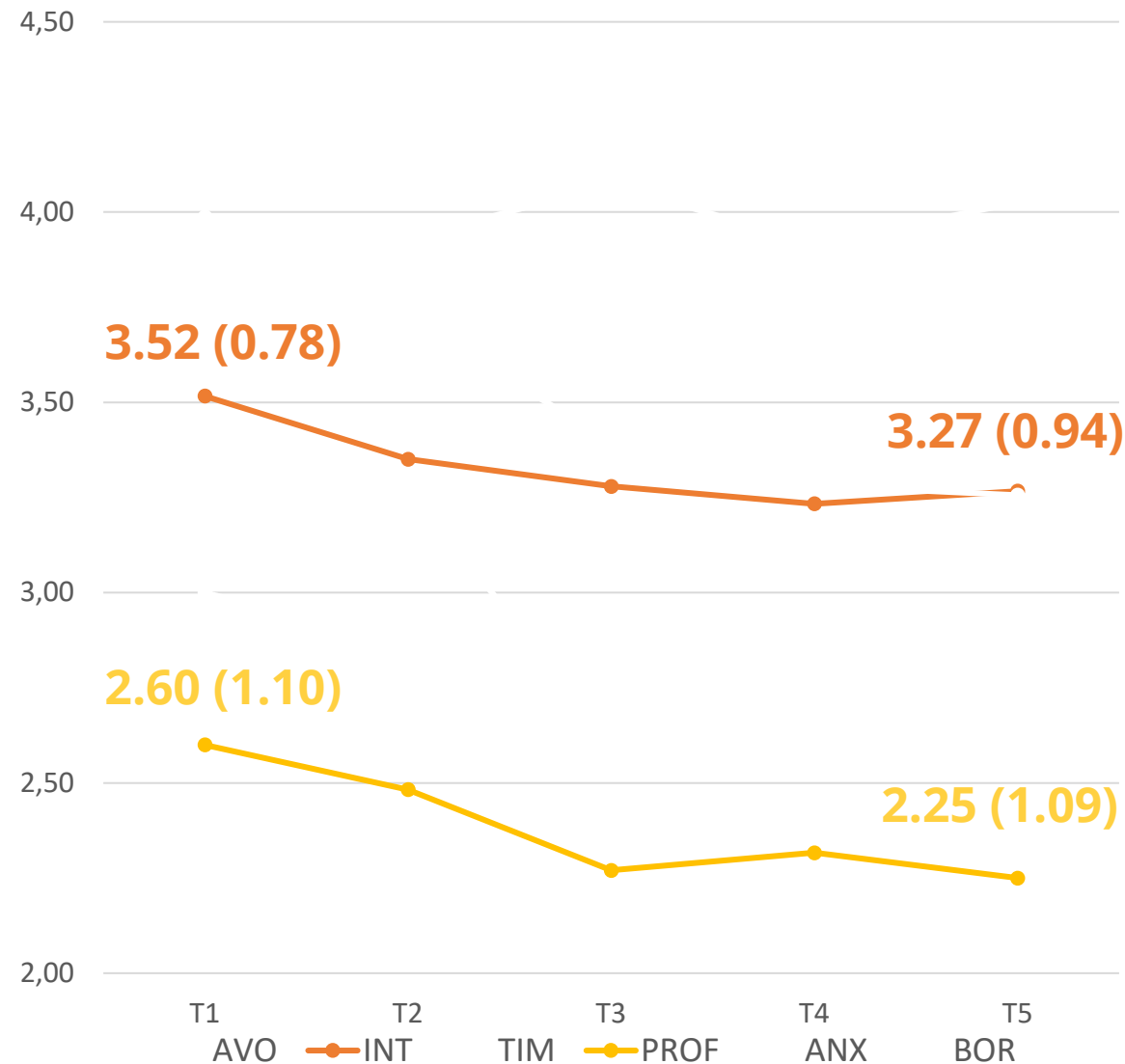


Profiles based on mean (M, SD) and ES (D)

Measured areas (T1-T5):

-
-
-
-
-
- **Intrinsic goal orientation (INT) ($D = 0.32^*$)**
-
- **Professional orientation (PROF) ($D = 0.34^*$)**
-
-
-

** Cohen D ES intermediate ($D = 0,5-0,8$)
 * Cohen D ES small ($D = 0,2-0,5$)



Profiles based on mean (M, SD) and ES (D)

Measured areas (T1-T5):

-
-
-
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-

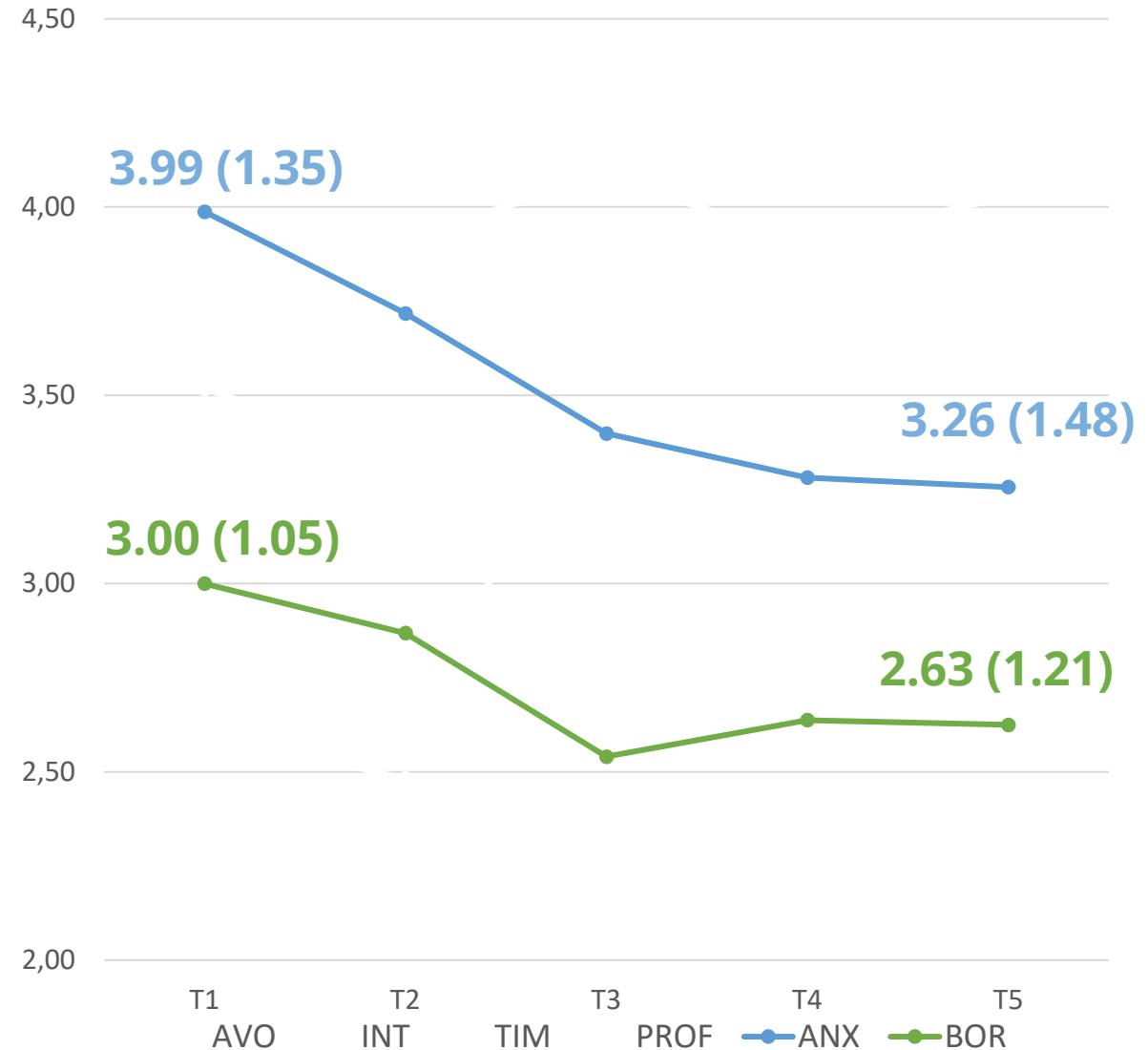
➤ **Anxiety towards QRM (ANX) (D = 0.64**)**

➤ **Boredom towards QRM (BOR) (D = 0.51**)**

➤

** Cohen *D* ES intermediate (*D* = 0,5-0,8)

* Cohen *D* ES small (*D* = 0,2-0,5)



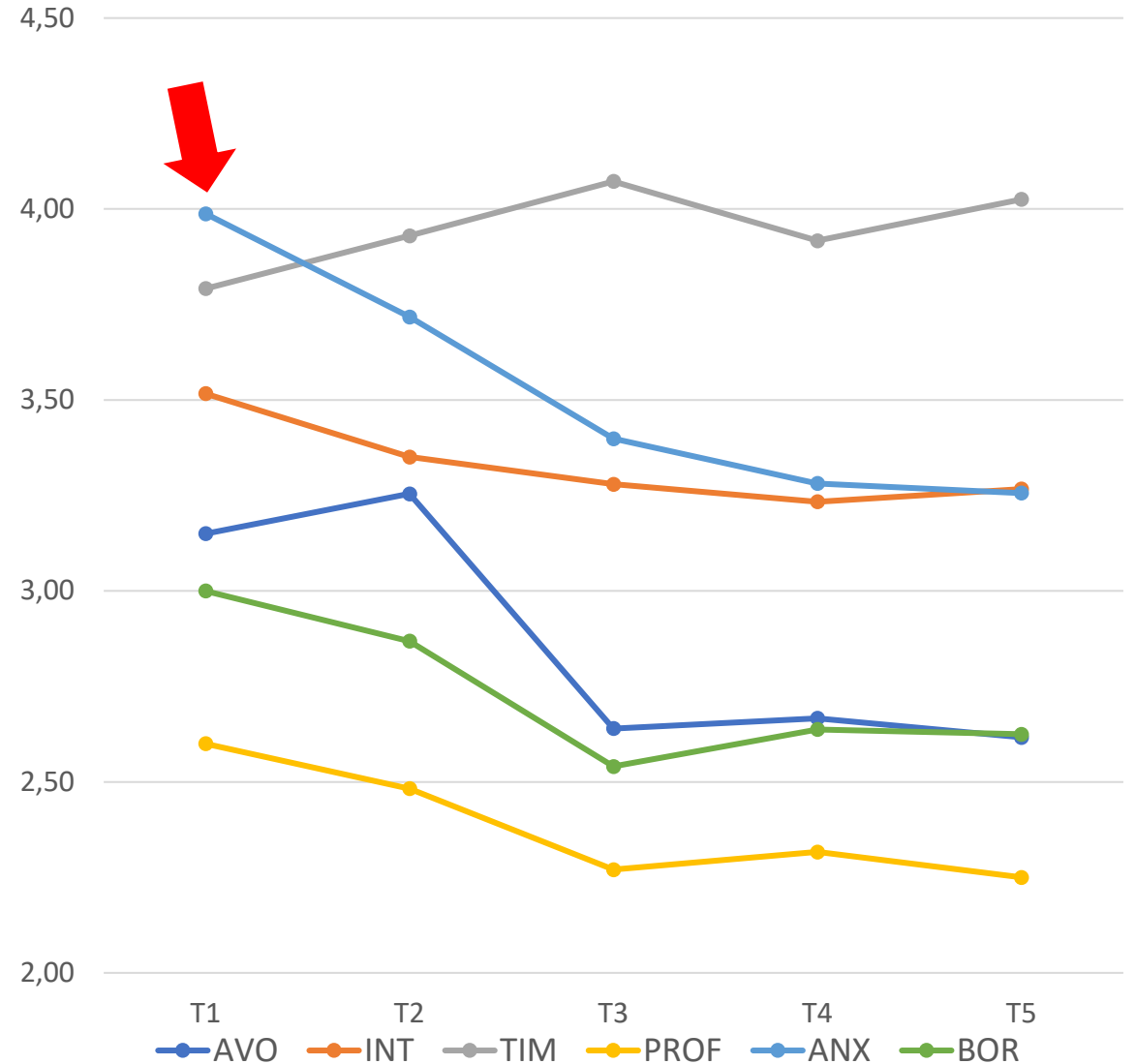
Profiles based on mean (M, SD) and ES (D)

Measured areas (T1-T5):

- Self-regulation of learning processes and results
- Lack of regulation
- **Task avoidance (AVO) ($D = 0.71^{**}$)**
- Self-efficacy for learning
- Extrinsic goal orientation
- **Intrinsic goal orientation (INT) ($D = 0.33^*$)**
- Time management (TIM) ($D = -0.38^*$)
- Mastery orientation
- **Professional orientation (PROF) ($D = 0.34^*$)**
- **Anxiety towards QRM (ANX) ($D = 0.64^{**}$)**
- **Boredom towards QRM (BOR) ($D = 0.51^{**}$)**
- Enjoyment towards QRM

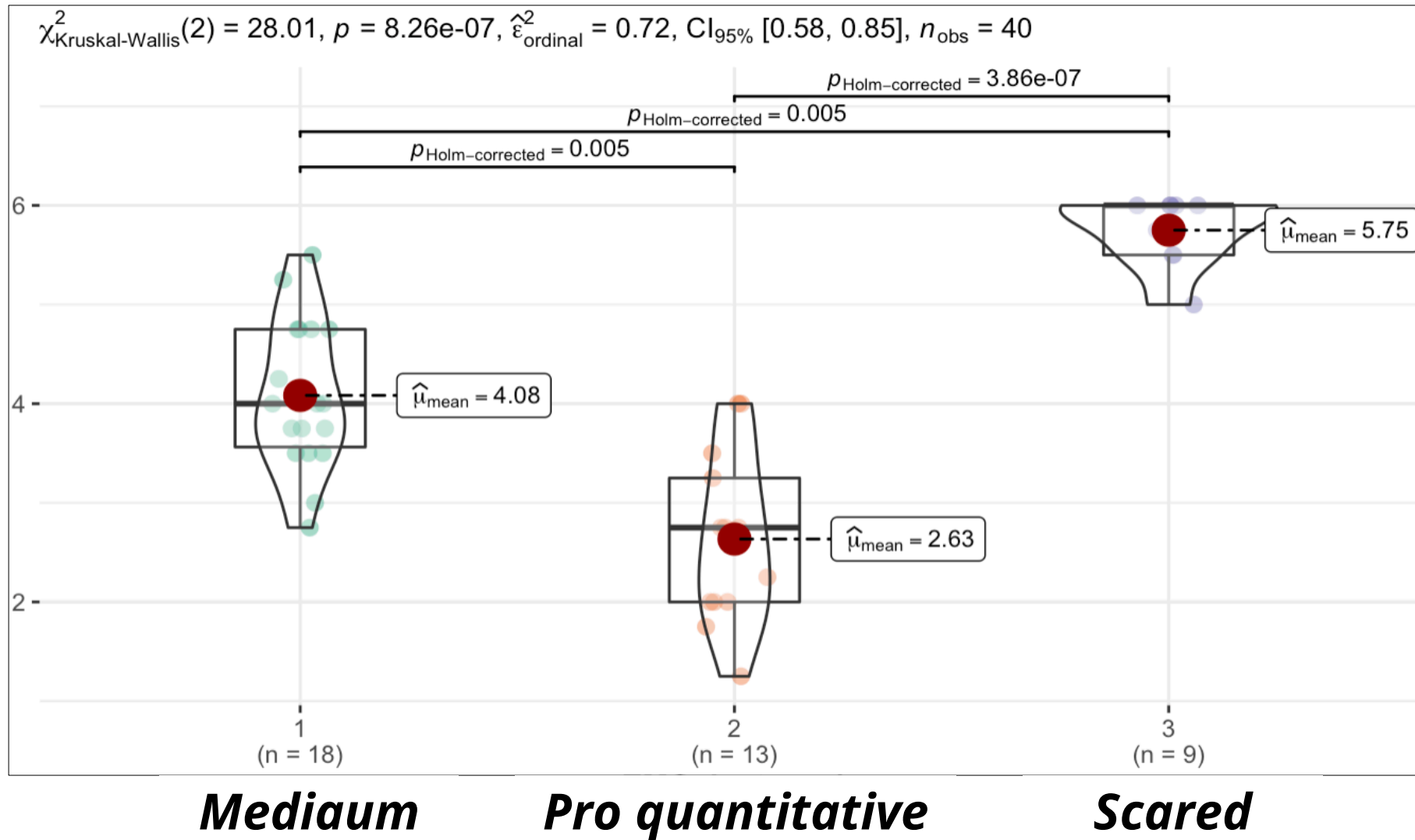
** Cohen D ES intermediate ($D = 0,5-0,8$)

* Cohen D ES small ($D = 0,2-0,5$)



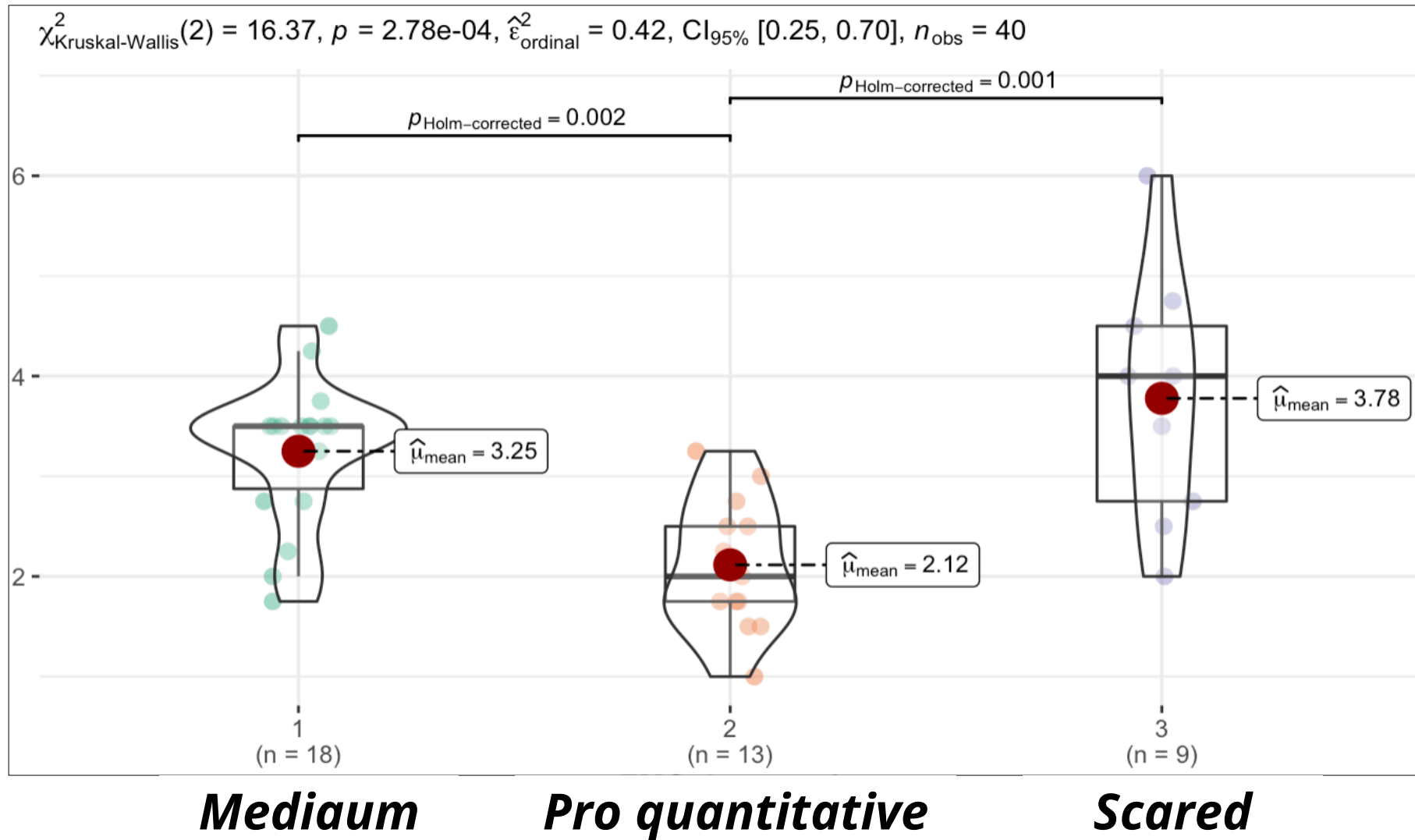
Results research 2

Anxiety



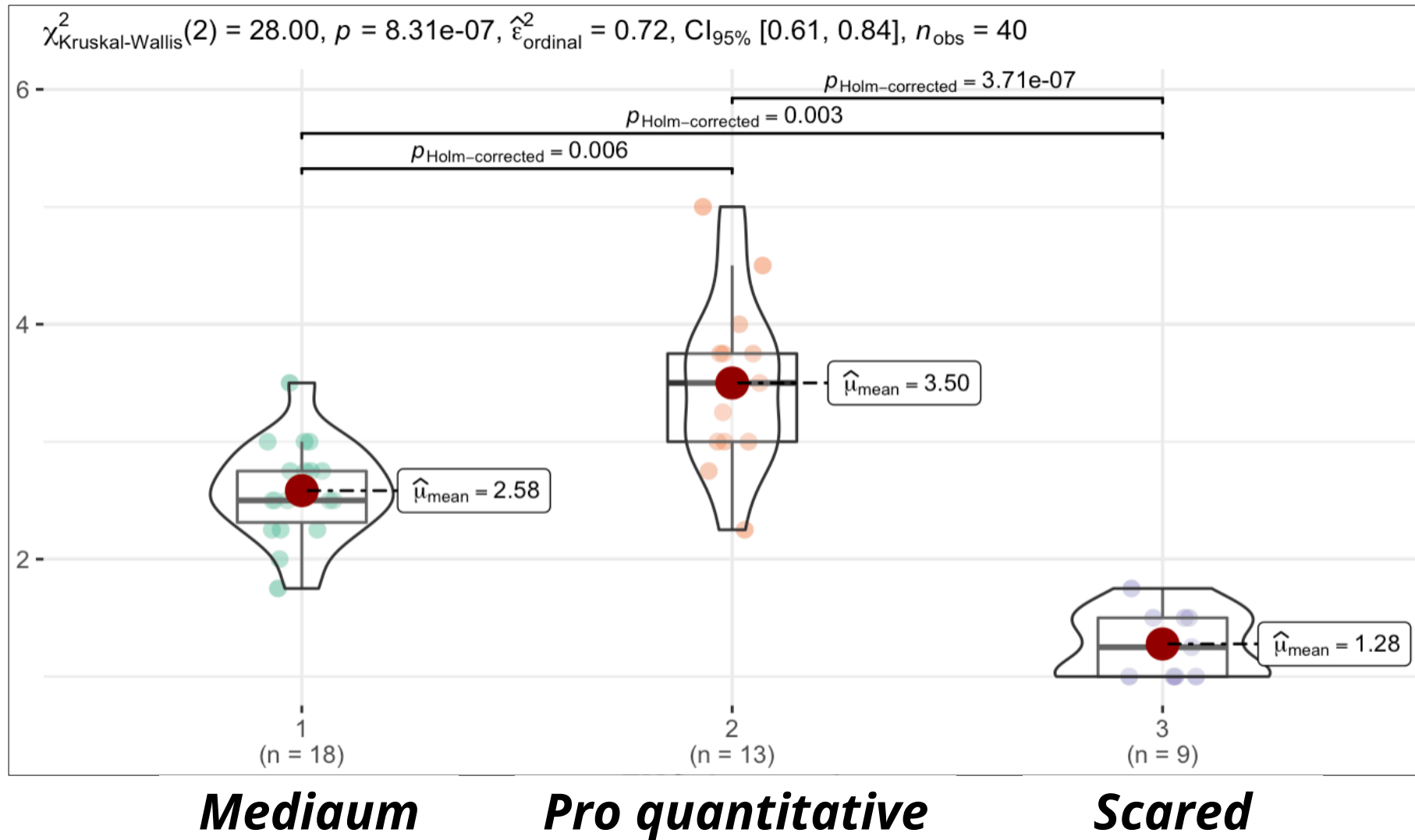
Epsilon ES : negligible ($\epsilon^2 < 0.01$), weak ($\epsilon^2 = 0.01 - 0.04$), moderate ($\epsilon^2 = 0.04 - 0.16$), relatively strong ($\epsilon^2 = 0.16 - 0.36$), strong ($\epsilon^2 = 0.36 - 0.64$), very strong ($\epsilon^2 = 0.64 - 0.99$)

Boredom



Epsilon *ES*: negligible ($\epsilon^2 < 0.01$), weak ($\epsilon^2 = 0.01 - 0.04$), moderate ($\epsilon^2 = 0.04 - 0.16$), relatively strong ($\epsilon^2 = 0.16 - 0.36$), strong ($\epsilon^2 = 0.36 - 0.64$), very strong ($\epsilon^2 = 0.64 - 0.99$)

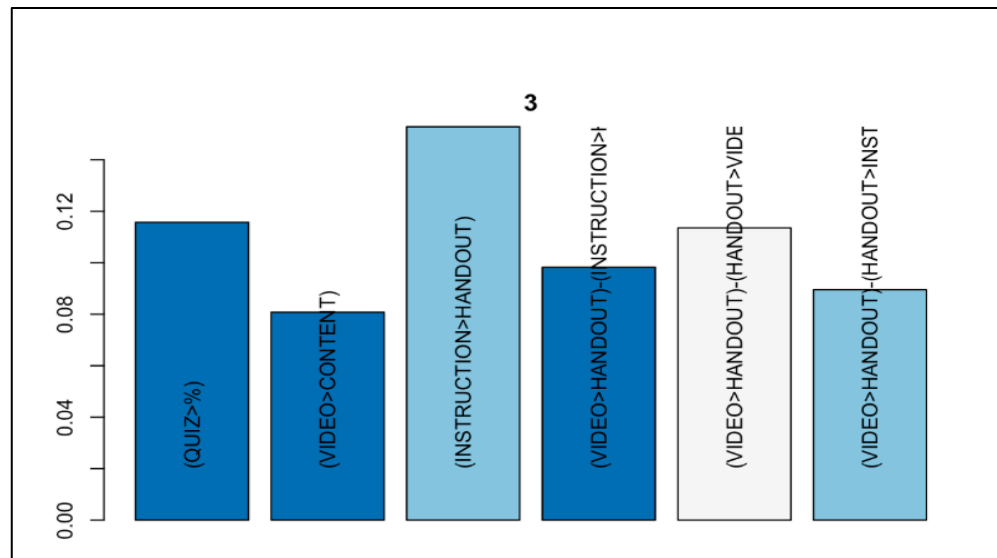
Enjoyment



Epsilon *ES*: negligible ($\epsilon^2 < 0.01$), weak ($\epsilon^2 = 0.01 - 0.04$), moderate ($\epsilon^2 = 0.04 - 0.16$), relatively strong ($\epsilon^2 = 0.16 - 0.36$), strong ($\epsilon^2 = 0.36 - 0.64$), very strong ($\epsilon^2 = 0.64 - 0.99$)

Use of learning materials

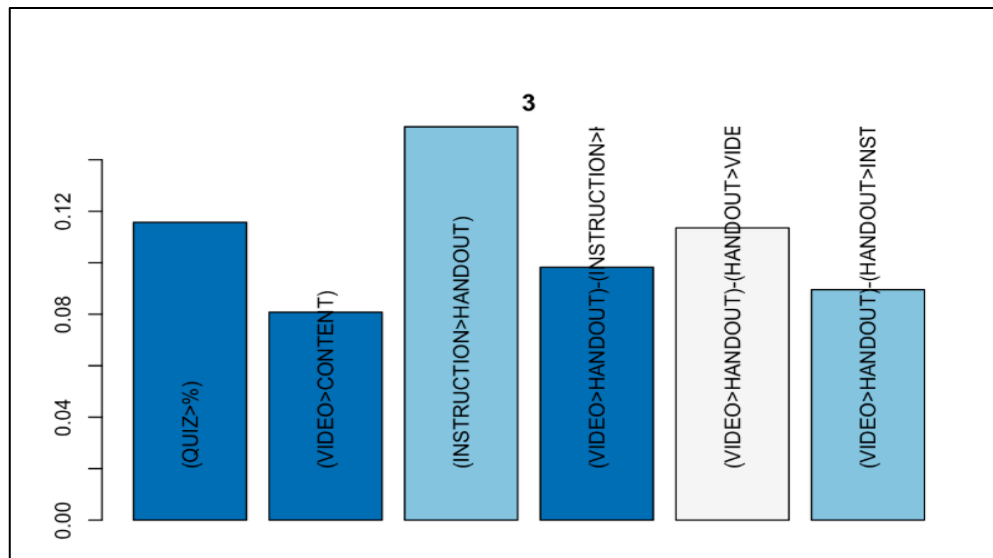
3 = Scared



Use of learning materials

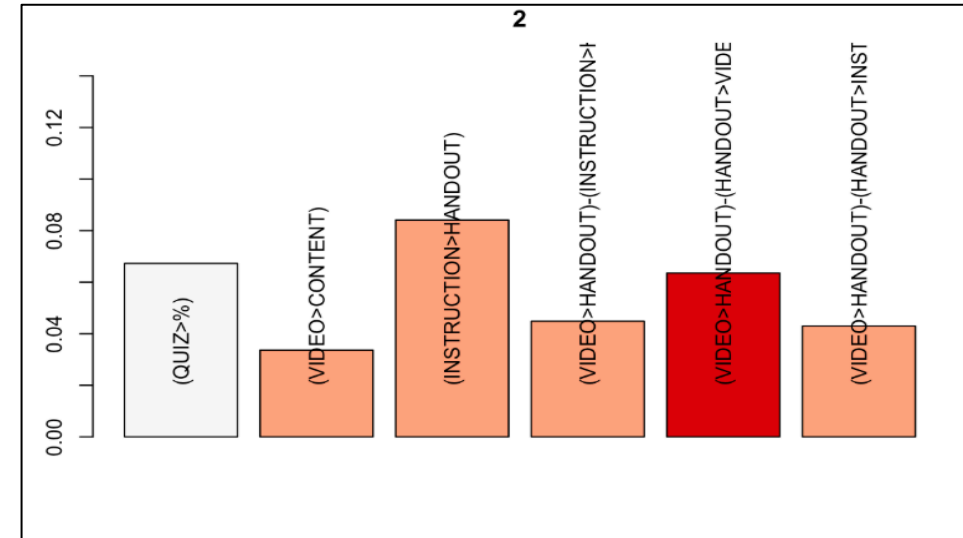
Students of *scared* cluster transferred between tasks and materials statistically significantly **more** than students in other clusters indicating stronger self-regulation.

3 = Scared



Use of learning materials

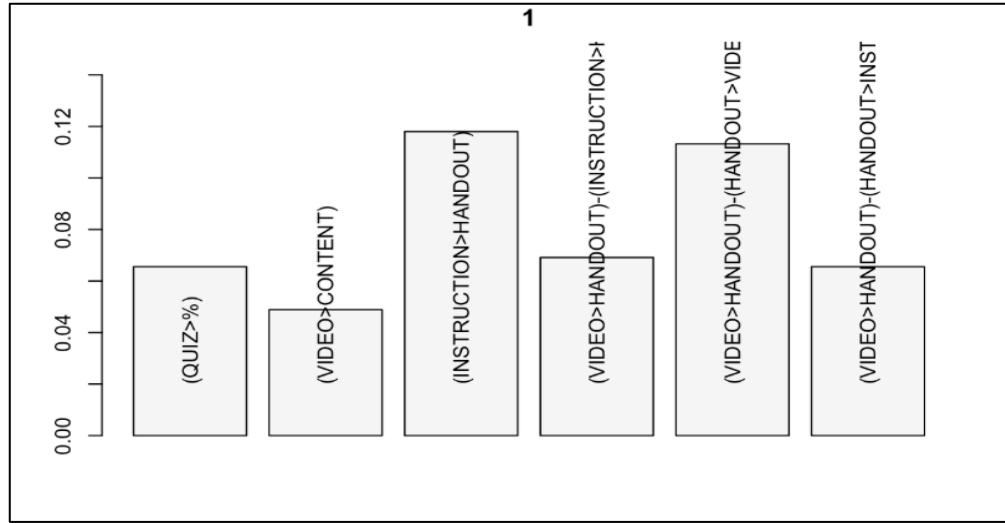
2 = Pro
quantitative



Students of *Pro quantitative* cluster transferred between tasks and materials statistically significantly **less** than students in other clusters indicating (a) lower self-regulation or (b) less need for this type of regulation (i.e., it already exists)

Use of learning materials

1 =
Medium



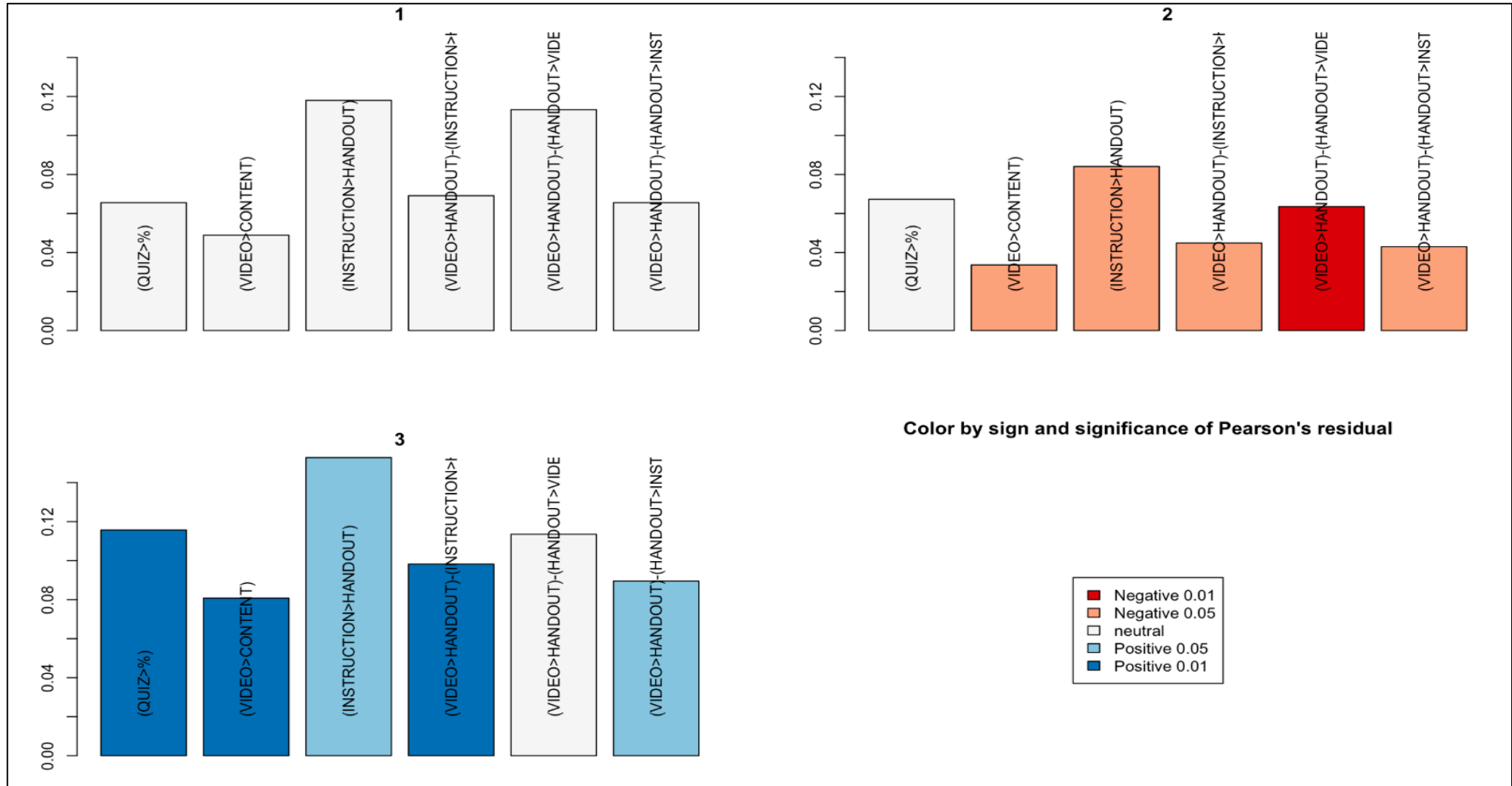
Students in *Medium* cluster did not differ statistically from other clusters.

Use of learning materials

1 =
Medium

2 = Pro
quantitative

3 =
Scared



Students in Scared cluster were most active → emotions can be activating or deactivating
 → Flipped approach, LA and well established digital learning environment support

SO WHAT



???

Final thoughts

- Remember to
 - Guide also to teaching approach (also environment and technology)
 - Aim for understanding (at least try to!)
 - Create safe atmosphere (places to ask from teacher/peers, discuss, contact [+ humor])
 - Make sure that you have even some skills to teach the content
 - Make sure that your students can use ICT (and guide to this too!)
- Flipped works in distance education (DO NOT DO EOL!)
- Tandem use of technology gives and opportunity to reach students (FCK breakout rooms)
- Learning analytics and dispositional learning analytics gives additional means for teacher to support, reach and interact with students (i.e., “tactile horns”)
- Consider also students’ emotions --> can be activating or deactivating
- Do research

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Kiitos!



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